

Name:

Solutions

1. Solve $2x^2 - 50 = 0$ $2(x^2 - 25) = 0$ $2(x-5)(x+5) = 0$
 $\{5, -5\}$
2. Solve $x^2 + 49 = 0$ $x^2 = -49$ $\sqrt{x^2} = \pm\sqrt{-49}$ $x = \pm 7i$
DNF $x = \pm i\sqrt{49}$ $\{7i, -7i\}$
3. Solve $t^3 - 12t = 0$ $t(t^2 - 12) = 0$
 $t = 0$ $t^2 - 12 = 0$ $t^2 = 12$ $t = \pm\sqrt{12}$ $\{2\sqrt{3}, -2\sqrt{3}, 0\}$ zero
4. Solve $n^2 + 10n + 25 = 0$ $(n+5)(n+5) = 0$
 $(n+5)^2 = 0$ $\{-5\}$
5. Solve $x^2 - 6x - 16 = 0$ $(x-8)(x+2) = 0$
 $\{8, -2\}$
6. Solve $p^2 - 4p + 2 = 0$
DNF
 $p = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(2)}}{2(1)} = \frac{4 \pm \sqrt{8}}{2} = \frac{4 \pm 2\sqrt{2}}{2} = 2 \pm \sqrt{2}$
 $\{2+\sqrt{2}, 2-\sqrt{2}\}$
7. Factor $y^3 - 27$
 $(y-3)(y^2 + 3y + 9)$
8. Solve $7m^2 - 21m = 0$ $7m(m-3) = 0$
 $\{0, 3\}$
9. Solve $2y^3 + 6y^2 - 36y = 0$ $2y(y^2 + 3y - 18) = 0$
 $2y(y+6)(y-3) = 0$ $\{0, -6, 3\}$

Solutions

18. Simplify $\frac{10x+5}{5} = 2x+1$ ✓

19. Simplify $\frac{10x+5}{15} = \frac{2x+1}{3}$ ✓

20. Simplify $\frac{9x^2-4}{3x-2}$ and state all restrictions on x

$$\frac{(3x-2)(3x+2)}{3x-2} = 3x+2 \quad \checkmark$$

Restrictions

$$3x-2 \neq 0$$

$$3x \neq 2$$

$$x \neq \frac{2}{3}$$

21. Simplify $\frac{x-5}{5-x}$ and state all restrictions on x

$$\frac{x-5}{5-x} = -1 \quad \checkmark$$

Restrictions

$$5-x \neq 0$$

$$5 \neq x$$

22. Simplify $\frac{x^2-16}{x^2-8x+16}$ and state all restrictions on x

$$\frac{(x-4)(x+4)}{(x-4)(x-4)} = \frac{x+4}{x-4} \quad \checkmark$$

Restrictions

$$x-4 \neq 0$$

$$x \neq 4$$

23. Simplify $\frac{x^3-8}{x-2}$ and state all restrictions on x

$$\frac{(x-2)(x^2+2x+4)}{x-2} = x^2+2x+4 \quad \checkmark$$

Restrictions

$$x-2 \neq 0$$

$$x \neq 2$$

24. Simplify $\frac{3x+4}{x-5} \times \frac{x+5}{3x+4}$ and state all restrictions on x

$$\frac{x+5}{x-5} \quad \checkmark$$

Restrictions

$$x-5 \neq 0$$

$$x \neq 5$$

$$3x+4 \neq 0$$

$$3x \neq -4$$

$$x \neq -\frac{4}{3}$$

25. Simplify $\frac{x^2+5x-14}{x^2-7x+10} \div \frac{x^2+10x+21}{x^2-2x-15}$ and state all restrictions on x

$$\frac{(x+7)(x-2)}{(x-2)(x-5)} \cdot \frac{(x-5)(x+3)}{(x+3)(x+7)} = 1$$

Restrictions

$$x \neq 2 \quad x \neq 5$$

$$x \neq -3 \quad x \neq -7$$

Solutions

10. Solve $w^2 + 6w + 10 = 0$ DMF

$$w = \frac{-6 \pm \sqrt{6^2 - 4(1)(10)}}{2(1)} = \frac{-6 \pm \sqrt{-4}}{2} = \frac{-6 \pm 2i}{2} = -3 \pm i$$

$$\{-3+i, -3-i\}$$

11. Solve $x^4 - 5x^2 - 36 = 0$

$$(x^2 - 9)(x^2 + 4) = 0$$

$$(x^2 - 3)(x^2 + 3)(x^2 + 4) = 0$$

$$x^2 + 4 = 0$$

$$x^2 = -4$$

$$x = \pm \sqrt{-4}$$

$$x = \pm 2i$$

$$\{3, -3, 2i, -2i\}$$

12. Solve $x^3 + 3x^2 - 4x - 12 = 0$ by grouping

$$x^2(x+3) - 4(x+3) = 0$$

$$(x+3)(x^2 - 4) = 0$$

$$(x+3)(x+2)(x-2) = 0$$

$$\{-3, -2, 2\}$$

13. Solve $x^3 - 3x^2 - 13x + 15 = 0$ (Hint: use $x-1$ is one factor in synthetic division)

$$\begin{array}{r|rrrr} 1 & 1 & -3 & -13 & 15 \\ & & 1 & -2 & -15 \\ \hline & 1 & -2 & -15 & 0=R \end{array}$$

$$x^2 - 2x - 15 = 0$$

$$(x-5)(x+3) = 0$$

$$\{1, 5, -3\}$$

14. A polynomial function of degree 3 has the solution set $\{0, \frac{-1}{2}, 4\}$. Determine the equation of the function in standard form.

$$x(2x+1)(x-4) = 0$$

$$x(2x^2 - 7x - 4) = 0$$

$$2x^3 - 7x^2 - 4x = 0 \checkmark$$

$$x=0 \quad x=-\frac{1}{2} \quad x=4$$

$$2x=-1 \quad x-4=0$$

$$2x+1=0$$

15. A polynomial function of degree 3 has the solution set $\{-3, 2\}$ where 2 is a double root.

Determine the equation of the function in standard form.

$$(x+3)(x-2)(x-2) = 0$$

$$(x+3)(x^2 - 4x + 4) = 0$$

$$x^3 - x^2 - 8x + 12 = 0 \checkmark$$

$$x=-3 \quad x=2 \quad x=2$$

$$x+3=0 \quad x-2=0 \quad x-2=0$$

16. Write an equation in standard form for the degree 2 polynomial function with the given solution set $\{2i, -2i\}$

$$x=2i \quad x=-2i$$

$$x-2i=0 \quad x+2i=0$$

$$(x-2i)(x+2i) = 0$$

$$x^2 + 2ix - 2ix - 4i^2 = 0$$

$$x^2 + 4 = 0 \checkmark$$

17. Write an equation in standard form for the degree 2 polynomial function with the given solution set $\{\sqrt{13}, -\sqrt{13}\}$

$$x=\sqrt{13} \quad x=-\sqrt{13}$$

$$x-\sqrt{13}=0 \quad x+\sqrt{13}=0$$

$$(x-\sqrt{13})(x+\sqrt{13}) = 0$$

$$x^2 + \sqrt{13}x - \sqrt{13}x - \sqrt{169} = 0$$

$$x^2 - 13 = 0 \checkmark$$